FCC PART 15.247

TEST REPORT

For

Hytera Communications Corporation Limited

Hytera Tower, Hi-Tech Industrial Park North, 9108# Beihuan Road, Nanshan District, Shenzhen, People's Republic of China

FCC ID: YAMDS-6610VPUC

Report Type:	**Product Type:**
Original Report	Hytera SmartOne

Test Engineer:	Lion Xiao
Report Number:	RDG160613002-00A
Report Date:	2016-07-27
Reviewed By:	Dean Liu RF Engineer
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Hytera Communications Corporation Limited*'s product, model number: *DS-6610 VPUC(FCC ID: YAMDS-6610VPUC)* (the "EUT") in this report was a *Hytera SmartOne,* which was measured approximately: 44.0 cm (L) x 36.0 cm (W) x 4.35 cm (H), rated input voltage: AC120V/60Hz.

All measurement and test data in this report was gathered from production sample serial number: 160613002 (Assigned byBACL, Dongguan). The EUT was received on 2016-06-09.

Objective

This report is prepared on behalf of *Hytera Communications Corporation Limited* . in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communications Commission's rules

The tests were performed in order to determine the compliance of the EUT with FCC Part 15-Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

N/A.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

Test site at Bay Area Compliance Laboratories Corp. (Dongguan) has been fully described in reports submitted to the Federal Communications Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 06, 2015.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in testing mode, which was provided by manufacturer.
For 2.4GHz band, 11 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437	/	/

For 802.11b, 802.11g, and 802.11n ht20 modes were tested with channel 1, 6 and 11.
For 802.11n ht40 mode were tested with Channel 3, 6 and 9.

The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all data rates bandwidths, and modulations.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

The worst condition (maximum power with 100% duty cycle) was setting by the software as following table:

Test Mode	Test Software Version	Putty.exe		
802.11b	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	1Mbps	1Mbps	1Mbps
	Power Level Setting	48	47	47
802.11g	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	6Mbps	6Mbps	6Mbps
	Power Level Setting	52	51	51
802.11n ht20	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level Setting	52	51	51
802.11n ht40	Test Frequency	2422MHz	2437MHz	2452MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level Setting	51	50	50

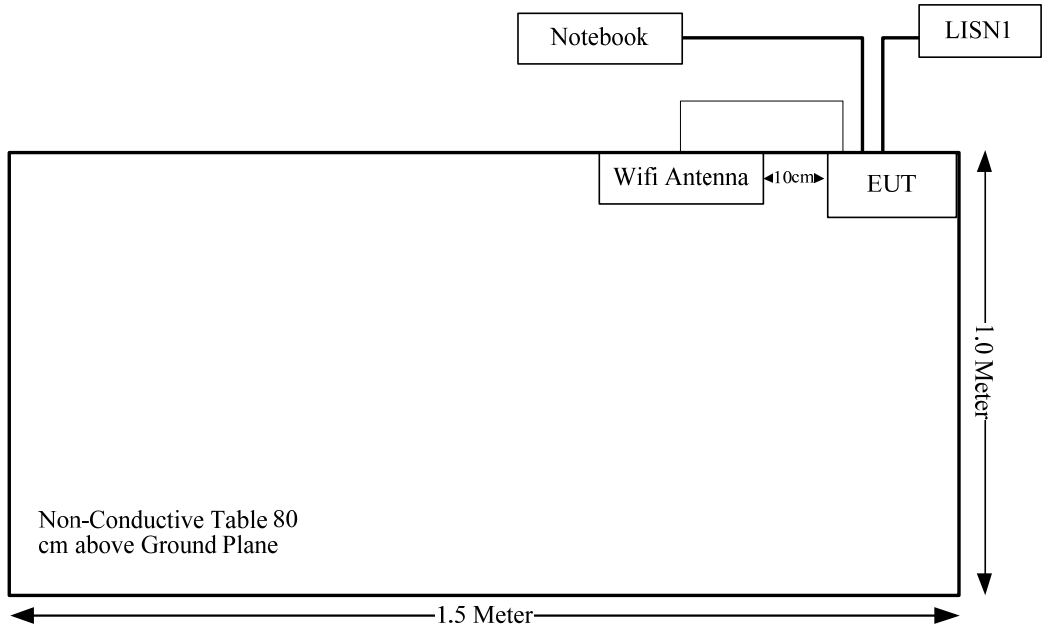
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Lenovo	Notebook	G510	CB30920865

External Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
AC Line	No	Yes	1.2	EUT	LISN
RJ45	No	No	10	EUT	Notebook

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 (i) & §1.1310 & §2.1091	Maximum Permissible Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB Emission Bandwidth	Compliance
§15.247(b)(3)	Maximum conducted output power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

FCC §15.247 (I) & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247(i) and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f²)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary:

Predication of MPE limit at a given distance
$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

MPE Results

The device was build in two WWAN modules(FCC: RI7GC864Q2), which supports GSM/GPRS 850 band and 1900 Band, The Tune-up power including tolerance as below:

Frequency Band	**Tune-Up Power Including Tolerance**
824-849MHz	**33 dBm**
1850-1910MHz	**30 dBm**

Calculated Data:

Frequency Range (MHz)	Antenna Gain		Tune-up Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)	S_i/S_{limi}
	(dBi)	(numeric)	(dBm)	(mW)				
2412-2462	2	1.58	22	158.49	35	0.016	1.0	0.016
824-849	2	1.58	33	1995.26	35	0.205	0.55	0.374
1850-1910	2	1.58	30	1000.00	35	0.103	1.0	0.103

Note: The wlan tune-up power and tolerance is 21±1.0dBm, and max antenna gain is 2 dBi.

The two WWAN modules can transmit simultaneously with WLAN, the maximum Ratio for WWAN in 824-849MHz band, and:

$$\sum_i \frac{S_i}{S_{Limit,i}}$$

$=S_{WWAN}/S_{limit\_WWA}*2+ S_{WLAN}/S_{limit\_WLAN}$

=0.374*2+0.016
=0.764

< 1.0

Result: The device meet FCC MPE at 35 cm distance.

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

Antenna Connector Construction

The EUT has one external antenna arrangement for WiFi, which was used for professional installation and installer is responsible for verifying that correct antenna is employed with the unit, and the antenna gain is 2.0 dBi, fulfill the requirement of this section. Please refer to the user manual.

Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

Measurement Uncertainty

Compliance or non- compliance with a disturbance limit shall be determined in the following manner：

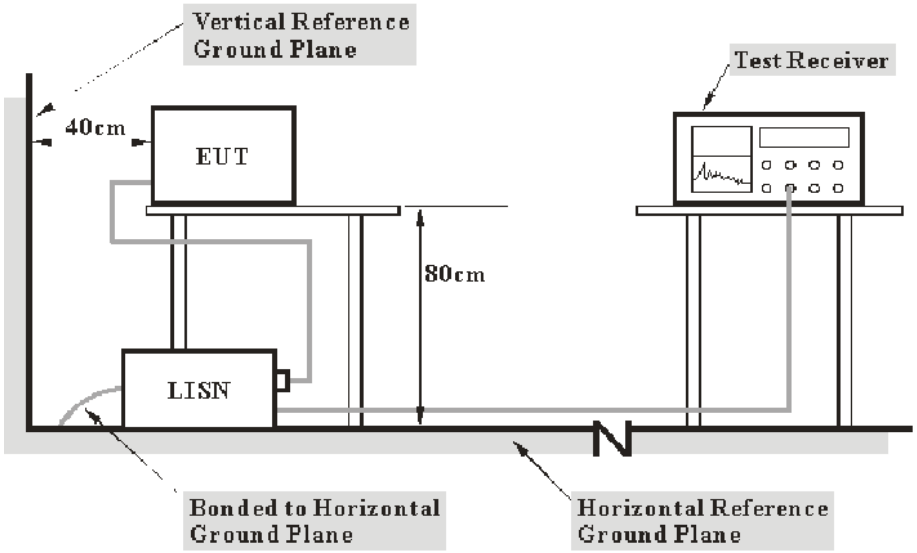
If U_{lab} is less than or equal to U_{cispr} of Table 1, then:
– compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
– non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.
If U_{lab} is greater than U_{cispr} of Table 1, then:
– compliance is deemed to occur if no measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit;
– non - compliance is deemed to occur if any measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit.

Based on CISPR 16-4-2-2011, measurement uncertainty of conducted disturbance at mains port using AMN at Bay Area Compliance Laboratories Corp. (Dongguan) is 3.12 dB (150 kHz to 30 MHz).

Table 1 – Values of U_{cispr}

Measurement	U_{cispr}
Conducted disturbance at mains port using AMN (150 kHz to 30 MHz)	3.4 dB

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The EUT was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the EUT was connected to the first LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$V_C = V_R + A_C + VDF$
$C_f = A_C + VDF$

Herein,
V_C (cord. Reading): corrected voltage amplitude
V_R: reading voltage amplitude
A_c: attenuation caused by cable loss
VDF: voltage division factor of AMN
C_f: Correction Factor

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the maximum limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCS 30	830245/006	2015-10-20	2016-10-20
R&S	L.I.S.N	ESH2-Z5	892107/021	2015-07-16	2016-07-15
R&S	Two-line V-network	ENV 216	3560.6550.12	2015-11-26	2016-11-25
N/A	Coaxial Cable	1.8m	N/A	2016-05-06	2017-05-06
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207, with the worst margin reading of:

8.3 dB at **4.614454 MHz** in the **Line** conducted mode

Test Data

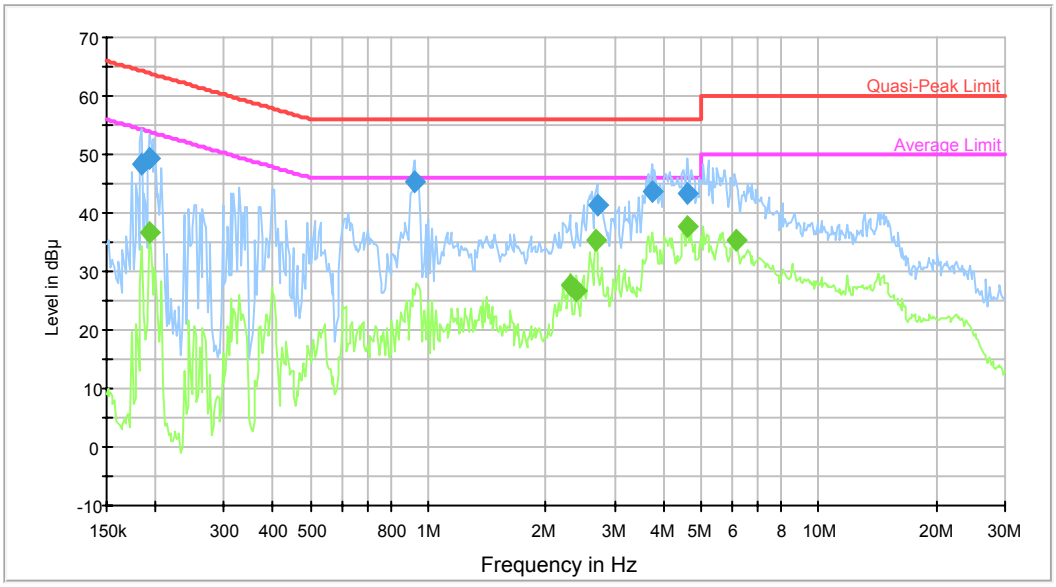
Environmental Conditions

Temperature:	28.4 °C
Relative Humidity:	40 %
ATM Pressure:	100.3 kPa

The testing was performed by Lion Xiao on 2016-07-06.

Test Mode: Transmitting

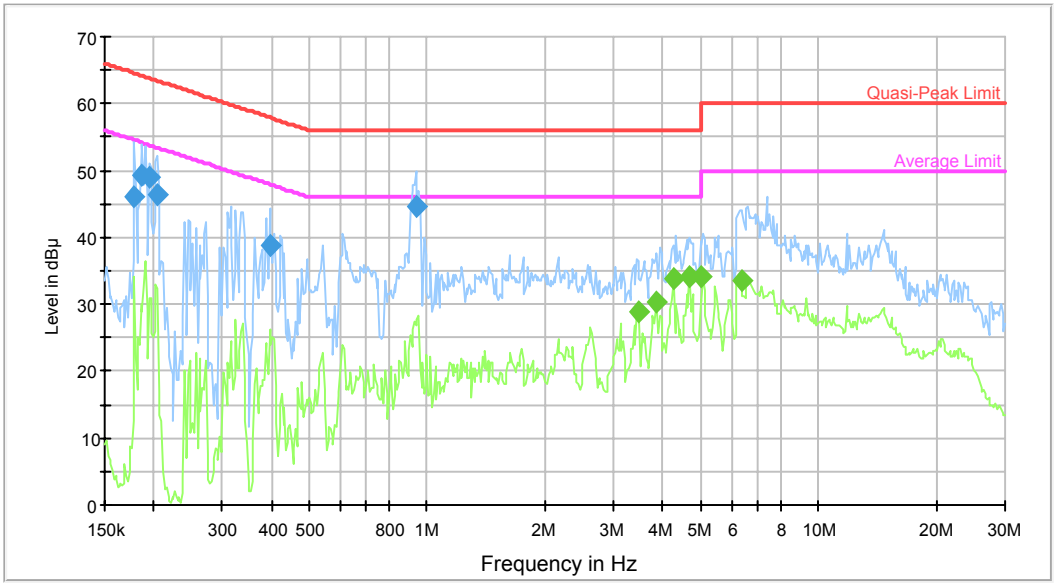
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.184529	48.4	9.000	L1	10.2	15.9	64.3	Compliance
0.193566	49.2	9.000	L1	10.2	14.7	63.9	Compliance
0.922769	45.3	9.000	L1	10.4	10.7	56.0	Compliance
2.705607	41.4	9.000	L1	10.5	14.6	56.0	Compliance
3.750995	43.7	9.000	L1	10.6	12.3	56.0	Compliance
4.614454	43.5	9.000	L1	10.7	12.5	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.193566	36.7	9.000	L1	10.2	17.2	53.9	Compliance
2.307034	27.7	9.000	L1	10.4	18.3	46.0	Compliance
2.400804	26.8	9.000	L1	10.4	19.2	46.0	Compliance
2.684134	35.2	9.000	L1	10.5	10.8	46.0	Compliance
4.614454	37.7	9.000	L1	10.7	8.3	46.0	Compliance
6.147514	35.2	9.000	L1	10.7	14.8	50.0	Compliance

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.178741	46.0	9.000	N	10.1	18.5	64.5	Compliance
0.187494	49.1	9.000	N	10.2	15.0	64.1	Compliance
0.195114	49.1	9.000	N	10.2	14.7	63.8	Compliance
0.204669	46.4	9.000	N	10.2	17.0	63.4	Compliance
0.396530	38.8	9.000	N	10.2	19.1	57.9	Compliance
0.937592	44.7	9.000	N	10.4	11.3	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
3.491417	28.9	9.000	N	10.6	17.1	46.0	Compliance
3.872475	30.4	9.000	N	10.6	15.6	46.0	Compliance
4.261034	33.8	9.000	N	10.7	12.2	46.0	Compliance
4.688581	34.2	9.000	N	10.7	11.8	46.0	Compliance
4.997188	34.1	9.000	N	10.7	11.9	46.0	Compliance
6.346607	33.4	9.000	N	10.7	16.6	50.0	Compliance

FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

Measurement Uncertainty

Compliance or non- compliance with a disturbance limit shall be determined in the following manner：

If U_{lab} is less than or equal to U_{cispr} of Table 2, then:
- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If U_{lab} is greater than U_{cispr} of Table 2, then:
- compliance is deemed to occur if no measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit.

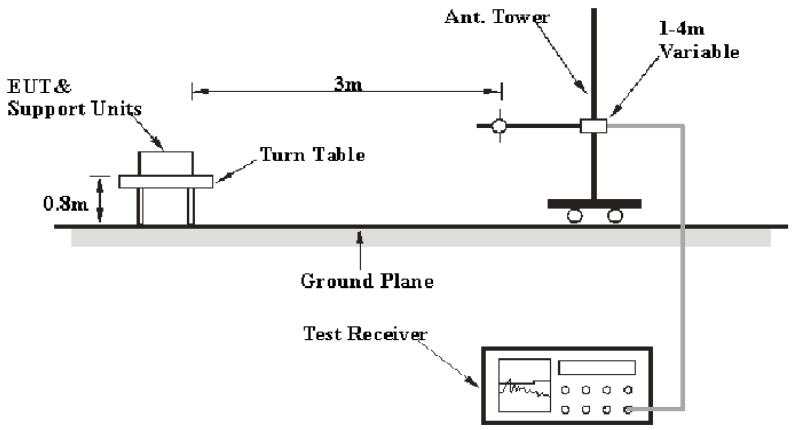
Based on CISPR 16-4-2: 2011, measurement uncertainty of radiated emission at a distance of 10m at Bay Area Compliance Laboratories Corp. (Dongguan) is:30M~200MHz: 4.55 dB for Horizontal, 4.57 dB for Vertical; 200M~1GHz: 4.66 dB for Horizontal, 4.56 dB for Vertical; measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is:30M~200MHz: 4.58 dB for Horizontal, 4.59 dB for Vertical; 200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical; 1G~6GHz: 4.45 dB, 6G~18GHz: 5.23 dB

Table 2 – Values of U_{cispr}

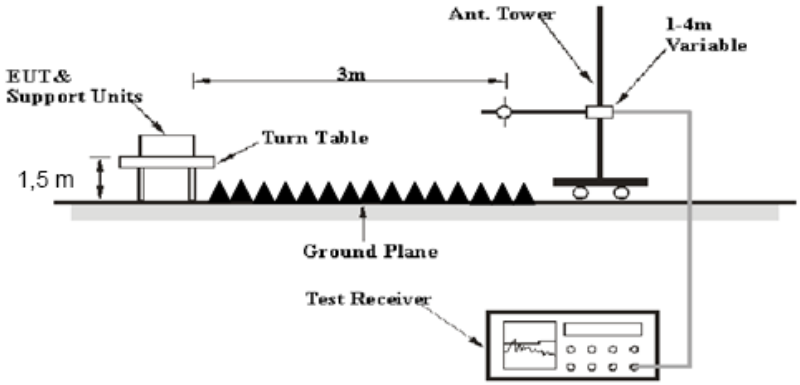
Measurement	U_{cispr}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.
The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	AV

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Loss and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Loss + Cable Loss - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit –Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2015-08-03	2016-08-02
Sunol Sciences	Antenna	JB3	A060611-3	2014-11-06	2017-11-05
HP	Amplifier	8447E	2434A02181	2015-09-01	2016-09-01
Agilent	Spectrum Analyzer	E4440A	SG43360054	2015-11-23	2016-11-22
ETS-Lindgren	Horn Antenna	3115	9808-5557	2015-09-06	2018-09-06
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2016-02-19	2017-02-19
R&S	Spectrum Analyzer	FSEM	DE23437	2015-11-23	2016-11-22
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2014-06-16	2017-06-15
Ducommun Technolagies	Horn Antenna	ARH-2823-02	1007726-02 1102	2014-09-16	2017-09-15
N/A	Coaxial Cable	14m	N/A	2016-05-06	2017-05-06
N/A	Coaxial Cable	8m	N/A	2016-05-06	2017-05-06
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2015-09-06	2016-09-06

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Section 15.205, 15.209 and 15.247, with the worst margin reading of:

3.14 dB at **4924 MHz i**n the **Horizontal** polarization for **802.11b** Mode

Test Data

Environmental Conditions

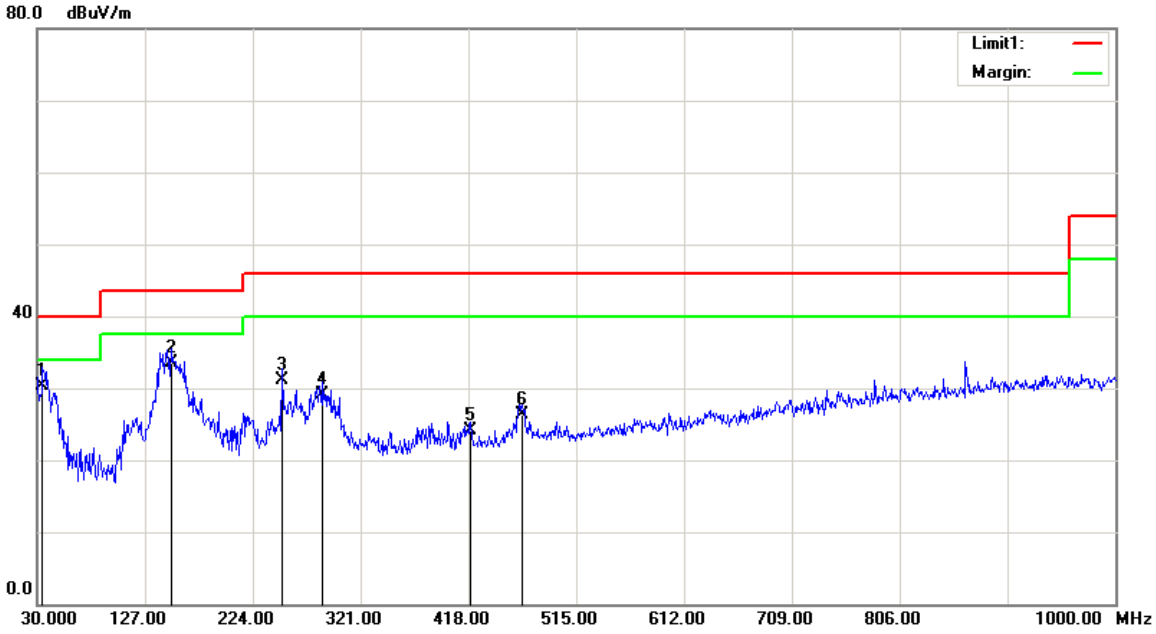
Temperature:	26.5 °C
Relative Humidity:	69 %
ATM Pressure:	99.9 kPa

The testing was performed by Lion Xiao on 2016-07-13.

Below 1G:

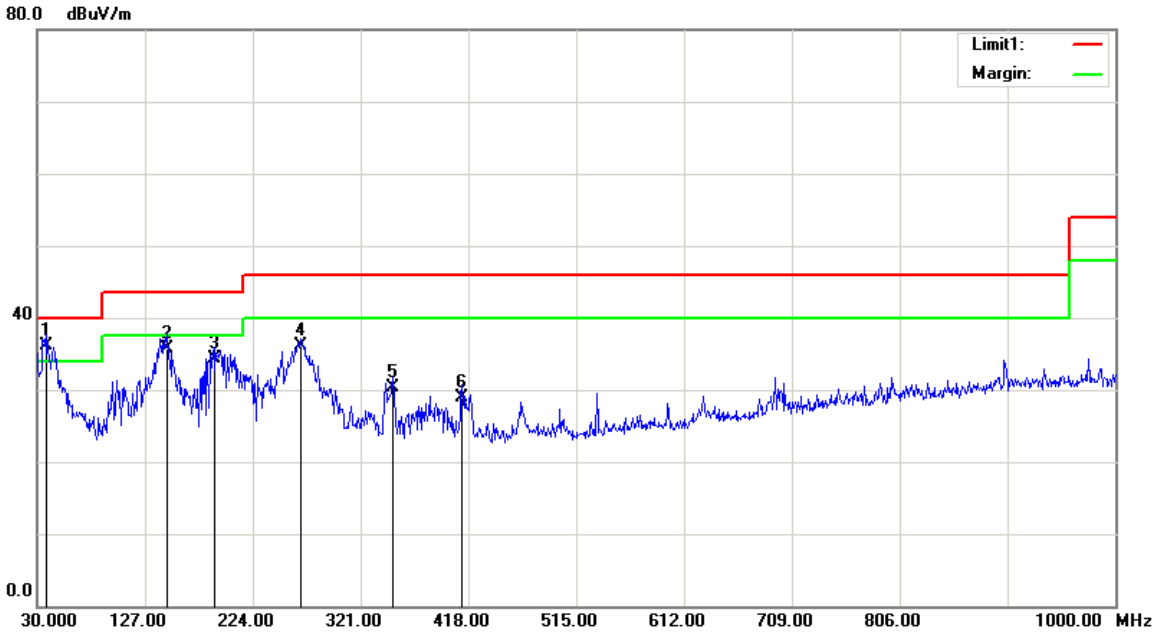
Test mode: 802.11b mode middle channel Transmitting-worst case

Horizontal:



Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
34.8500	32.93	QP	-2.63	30.30	40.00	9.70
150.2800	40.65	QP	-7.15	33.50	43.50	10.00
250.1900	38.77	QP	-7.67	31.10	46.00	14.90
287.0500	35.11	QP	-5.91	29.20	46.00	16.80
419.9400	27.45	QP	-3.25	24.20	46.00	21.80
466.5000	28.07	QP	-1.77	26.30	46.00	19.70

Vertical:



Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
38.7300	41.71	QP	-5.61	36.10	40.00	3.90
147.3700	42.88	QP	-7.08	35.80	43.50	7.70
189.0800	42.60	QP	-8.30	34.30	43.50	9.20
266.6800	42.49	QP	-6.29	36.20	46.00	9.80
350.1000	34.98	QP	-4.68	30.30	46.00	15.70
412.1800	32.27	QP	-3.37	28.90	46.00	17.10

Above 1G:

Test Mode: Transmitting

802.11b Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	68.73	PK	H	25.67	3.68	0.00	98.08	N/A	N/A
2412	59.97	AV	H	25.67	3.68	0.00	89.32	N/A	N/A
2412	72.25	PK	V	25.67	3.68	0.00	101.60	N/A	N/A
2412	63.83	AV	V	25.67	3.68	0.00	93.18	N/A	N/A
2390	28.40	PK	V	25.61	3.63	0.00	57.64	74.00	16.36
2390	16.05	AV	V	25.61	3.63	0.00	45.29	54.00	8.71
4824	50.29	PK	V	30.64	5.03	27.41	58.55	74.00	15.45
4824	41.55	AV	V	30.64	5.03	27.41	49.81	54.00	4.19
7236	35.26	PK	V	34.17	6.65	25.90	50.18	74.00	23.82
7236	23.21	AV	V	34.17	6.65	25.90	38.13	54.00	15.87
3131	35.69	PK	V	27.62	6.93	27.43	42.81	74.00	31.19
3131	23.35	AV	V	27.62	6.93	27.43	30.47	54.00	23.53
Middle Channel: 2437 MHz									
2437	68.41	PK	H	25.74	3.75	0.00	97.90	N/A	N/A
2437	59.67	AV	H	25.74	3.75	0.00	89.16	N/A	N/A
2437	73.79	PK	V	25.74	3.75	0.00	103.28	N/A	N/A
2437	64.24	AV	V	25.74	3.75	0.00	93.73	N/A	N/A
4874	51.57	PK	V	30.77	5.14	27.42	60.06	74.00	13.94
4874	40.84	AV	V	30.77	5.14	27.42	49.33	54.00	4.67
7311	35.53	PK	V	34.35	6.74	25.88	50.74	74.00	23.26
7311	23.49	AV	V	34.35	6.74	25.88	38.70	54.00	15.30
3131	35.98	PK	V	27.62	6.93	27.43	43.10	74.00	30.90
3131	23.60	AV	V	27.62	6.93	27.43	30.72	54.00	23.28
3652	33.84	PK	V	29.13	4.53	27.30	40.20	74.00	33.80
3652	21.41	AV	V	29.13	4.53	27.30	27.77	54.00	26.23
High Channel: 2462 MHz									
2462	68.81	PK	H	25.80	3.75	0.00	98.36	N/A	N/A
2462	59.05	AV	H	25.80	3.75	0.00	88.60	N/A	N/A
2462	73.24	PK	V	25.80	3.75	0.00	102.79	N/A	N/A
2462	64.61	AV	V	25.80	3.75	0.00	94.16	N/A	N/A
2483.5	28.87	PK	V	25.86	3.67	0.00	58.40	74.00	15.60
2483.5	15.37	AV	V	25.86	3.67	0.00	44.90	54.00	9.10
4924	50.36	PK	V	30.90	5.34	27.43	59.17	74.00	14.83
4924	42.05	AV	V	30.90	5.34	27.43	50.86	54.00	3.14
7386	35.77	PK	V	34.53	6.83	25.86	51.27	74.00	22.73
7386	23.74	AV	V	34.53	6.83	25.86	39.24	54.00	14.76
3268	35.13	PK	V	28.06	5.89	27.31	41.77	74.00	32.23
3268	23.85	AV	V	28.06	5.89	27.31	30.49	54.00	23.51

802.11g Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	68.06	PK	H	25.67	3.68	0.00	97.41	N/A	N/A
2412	58.95	AV	H	25.67	3.68	0.00	88.30	N/A	N/A
2412	73.84	PK	V	25.67	3.68	0.00	103.19	N/A	N/A
2412	63.35	AV	V	25.67	3.68	0.00	92.70	N/A	N/A
2390	30.94	PK	V	25.61	3.63	0.00	60.18	74.00	13.82
2390	17.35	AV	V	25.61	3.63	0.00	46.59	54.00	7.41
4824	46.32	PK	V	30.64	5.03	27.41	54.58	74.00	19.42
4824	33.68	AV	V	30.64	5.03	27.41	41.94	54.00	12.06
7236	34.34	PK	V	34.17	6.65	25.90	49.26	74.00	24.74
7236	21.91	AV	V	34.17	6.65	25.90	36.83	54.00	17.17
3210	32.91	PK	V	27.87	6.13	27.36	39.55	74.00	34.45
3210	20.44	AV	V	27.87	6.13	27.36	27.08	54.00	26.92
Middle Channel: 2437 MHz									
2437	68.49	PK	H	25.74	3.75	0.00	97.98	N/A	N/A
2437	58.93	AV	H	25.74	3.75	0.00	88.42	N/A	N/A
2437	73.72	PK	V	25.74	3.75	0.00	103.21	N/A	N/A
2437	63.07	AV	V	25.74	3.75	0.00	92.56	N/A	N/A
4874	47.21	PK	V	30.77	5.14	27.42	55.70	74.00	18.30
4874	34.85	AV	V	30.77	5.14	27.42	43.34	54.00	10.66
7311	34.68	PK	V	34.35	6.74	25.88	49.89	74.00	24.11
7311	22.25	AV	V	34.35	6.74	25.88	37.46	54.00	16.54
3093	35.39	PK	V	27.50	6.81	27.46	42.24	74.00	31.76
3093	23.83	AV	V	27.50	6.81	27.46	30.68	54.00	23.32
3489	33.80	PK	V	28.76	4.61	27.23	39.94	74.00	34.06
3489	21.46	AV	V	28.76	4.61	27.23	27.60	54.00	26.40
High Channel: 2462 MHz									
2462	68.64	PK	H	25.80	3.75	0.00	98.19	N/A	N/A
2462	58.74	AV	H	25.80	3.75	0.00	88.29	N/A	N/A
2462	73.27	PK	V	25.80	3.75	0.00	102.82	N/A	N/A
2462	63.59	AV	V	25.80	3.75	0.00	93.14	N/A	N/A
2483.5	31.01	PK	V	25.86	3.67	0.00	60.54	74.00	13.46
2483.5	17.36	AV	V	25.86	3.67	0.00	46.89	54.00	7.11
4924	47.71	PK	V	30.90	5.34	27.43	56.52	74.00	17.48
4924	35.48	AV	V	30.90	5.34	27.43	44.29	54.00	9.71
7386	35.05	PK	V	34.53	6.83	25.86	50.55	74.00	23.45
7386	22.57	AV	V	34.53	6.83	25.86	38.07	54.00	15.93
3326	35.63	PK	V	28.24	4.96	27.26	41.57	74.00	32.43
3326	23.10	AV	V	28.24	4.96	27.26	29.04	54.00	24.96

802.11 n ht20 Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	67.58	PK	H	25.67	3.68	0.00	96.93	N/A	N/A
2412	55.12	AV	H	25.67	3.68	0.00	84.47	N/A	N/A
2412	72.93	PK	V	25.67	3.68	0.00	102.28	N/A	N/A
2412	60.69	AV	V	25.67	3.68	0.00	90.04	N/A	N/A
2390	30.22	PK	V	25.61	3.63	0.00	59.46	74.00	14.54
2390	18.29	AV	V	25.61	3.63	0.00	47.53	54.00	6.47
4824	49.18	PK	V	30.64	5.03	27.41	57.44	74.00	16.56
4824	37.50	AV	V	30.64	5.03	27.41	45.76	54.00	8.24
7236	33.49	PK	V	34.17	6.65	25.90	48.41	74.00	25.59
7236	21.02	AV	V	34.17	6.65	25.90	35.94	54.00	18.06
3265	35.01	PK	V	28.05	5.96	27.31	41.71	74.00	32.29
3265	23.56	AV	V	28.05	5.96	27.31	30.26	54.00	23.74
Middle Channel: 2437 MHz									
2437	67.10	PK	H	25.74	3.75	0.00	96.59	N/A	N/A
2437	55.62	AV	H	25.74	3.75	0.00	85.11	N/A	N/A
2437	72.22	PK	V	25.74	3.75	0.00	101.71	N/A	N/A
2437	59.94	AV	V	25.74	3.75	0.00	89.43	N/A	N/A
4874	49.49	PK	V	30.77	5.14	27.42	57.98	74.00	16.02
4874	37.86	AV	V	30.77	5.14	27.42	46.35	54.00	7.65
7311	34.72	PK	V	34.35	6.74	25.88	49.93	74.00	24.07
7311	22.26	AV	V	34.35	6.74	25.88	37.47	54.00	16.53
3125	35.22	PK	V	27.60	6.91	27.43	42.30	74.00	31.70
3125	23.83	AV	V	27.60	6.91	27.43	30.91	54.00	23.09
3581	33.86	PK	V	28.98	4.58	27.26	40.16	74.00	33.84
3581	21.40	AV	V	28.98	4.58	27.26	27.70	54.00	26.30
High Channel: 2462 MHz									
2462	67.24	PK	H	25.80	3.75	0.00	96.79	N/A	N/A
2462	55.89	AV	H	25.80	3.75	0.00	85.44	N/A	N/A
2462	72.16	PK	V	25.80	3.75	0.00	101.71	N/A	N/A
2462	60.88	AV	V	25.80	3.75	0.00	90.43	N/A	N/A
2483.5	33.90	PK	V	25.86	3.67	0.00	63.43	74.00	10.57
2483.5	17.86	AV	V	25.86	3.67	0.00	47.39	54.00	6.61
4924	49.91	PK	V	30.90	5.34	27.43	58.72	74.00	15.28
4924	37.74	AV	V	30.90	5.34	27.43	46.55	54.00	7.45
7386	33.98	PK	V	34.53	6.83	25.86	49.48	74.00	24.52
7386	21.54	AV	V	34.53	6.83	25.86	37.04	54.00	16.96
3260	35.52	PK	V	28.03	6.08	27.32	42.31	74.00	31.69
3260	23.12	AV	V	28.03	6.08	27.32	29.91	54.00	24.09

802.11 n ht40 Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB)					
Low Channel: 2422 MHz									
2422	65.09	PK	H	25.70	3.71	0.00	94.50	N/A	N/A
2422	53.63	AV	H	25.70	3.71	0.00	83.04	N/A	N/A
2422	71.59	PK	V	25.70	3.71	0.00	101.00	N/A	N/A
2422	59.37	AV	V	25.70	3.71	0.00	88.78	N/A	N/A
2390	34.65	PK	V	25.61	3.63	0.00	63.89	74.00	10.11
2390	19.52	AV	V	25.61	3.63	0.00	48.76	54.00	5.24
4844	45.41	PK	V	30.69	4.99	27.42	53.67	74.00	20.33
4844	32.86	AV	V	30.69	4.99	27.42	41.12	54.00	12.88
7266	33.72	PK	V	34.24	6.68	25.89	48.75	74.00	25.25
7266	21.23	AV	V	34.24	6.68	25.89	36.26	54.00	17.74
3131	35.25	PK	V	27.62	6.93	27.43	42.37	74.00	31.63
3131	23.83	AV	V	27.62	6.93	27.43	30.95	54.00	23.05
Middle Channel: 2437 MHz									
2437	65.53	PK	H	25.74	3.75	0.00	95.02	N/A	N/A
2437	53.99	AV	H	25.74	3.75	0.00	83.48	N/A	N/A
2437	71.75	PK	V	25.74	3.75	0.00	101.24	N/A	N/A
2437	59.67	AV	V	25.74	3.75	0.00	89.16	N/A	N/A
4874	46.56	PK	V	30.77	5.14	27.42	55.05	74.00	18.95
4874	34.03	AV	V	30.77	5.14	27.42	42.52	54.00	11.48
7311	33.87	PK	V	34.35	6.74	25.88	49.08	74.00	24.92
7311	21.40	AV	V	34.35	6.74	25.88	36.61	54.00	17.39
3125	35.36	PK	V	27.60	6.91	27.43	42.44	74.00	31.56
3125	23.93	AV	V	27.60	6.91	27.43	31.01	54.00	22.99
3596	33.58	PK	V	29.01	4.62	27.27	39.94	74.00	34.06
3596	21.16	AV	V	29.01	4.62	27.27	27.52	54.00	26.48
High Channel: 2452 MHz									
2452	65.74	PK	H	25.78	3.78	0.00	95.30	N/A	N/A
2452	53.30	AV	H	25.78	3.78	0.00	82.86	N/A	N/A
2452	71.81	PK	V	25.78	3.78	0.00	101.37	N/A	N/A
2452	59.62	AV	V	25.78	3.78	0.00	89.18	N/A	N/A
2483.5	32.32	PK	V	25.86	3.67	0.00	61.85	74.00	12.15
2483.5	18.93	AV	V	25.86	3.67	0.00	48.46	54.00	5.54
4904	46.69	PK	V	30.85	5.31	27.43	55.42	74.00	18.58
4904	34.21	AV	V	30.85	5.31	27.43	42.94	54.00	11.06
7356	33.98	PK	V	34.45	6.79	25.87	49.35	74.00	24.65
7356	21.53	AV	V	34.45	6.79	25.87	36.90	54.00	17.10
3119	35.49	PK	V	27.58	6.89	27.43	42.53	74.00	31.47
3119	23.11	AV	V	27.58	6.89	27.43	30.15	54.00	23.85

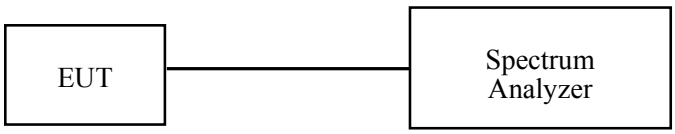
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

Applicable Standard

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Procedure

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3×RBW
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2015-11-23	2016-11-22
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	31.2 °C
Relative Humidity:	53 %
ATM Pressure:	100.2 kPa

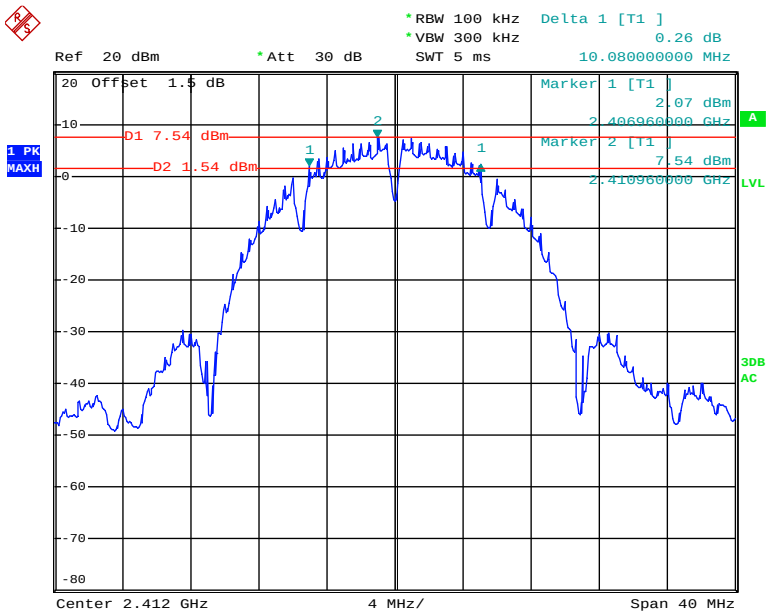
** The testing was performed by Lion Xiao on 2016-06-10.*

Test Mode: Transmitting

Test Result: Compliant. Please refer to the following table and plots.

Test mode	Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)
802.11b	Low	2412	10.08	≥0.5
	Middle	2437	9.20	≥0.5
	High	2462	9.68	≥0.5
802.11g	Low	2412	16.48	≥0.5
	Middle	2437	16.48	≥0.5
	High	2462	16.48	≥0.5
802.11n20	Low	2412	17.76	≥0.5
	Middle	2437	17.76	≥0.5
	High	2462	17.68	≥0.5
802.11n40	Low	2422	35.84	≥0.5
	Middle	2437	35.52	≥0.5
	High	2452	35.52	≥0.5

802.11b Low Channel



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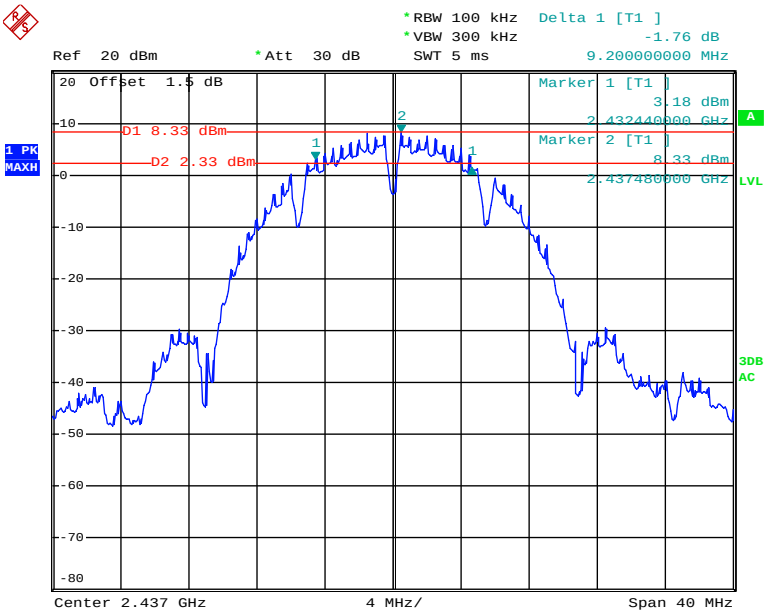
802.11b Middle Channel



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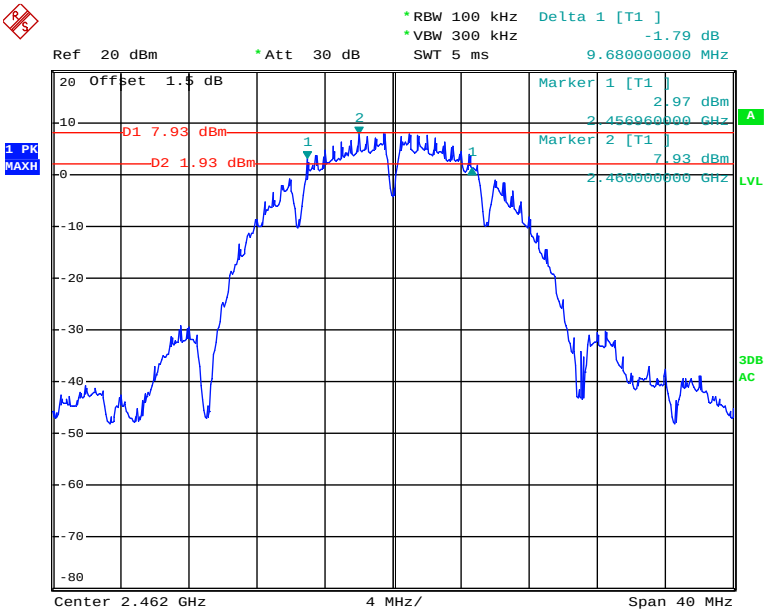
802.11b High Channel



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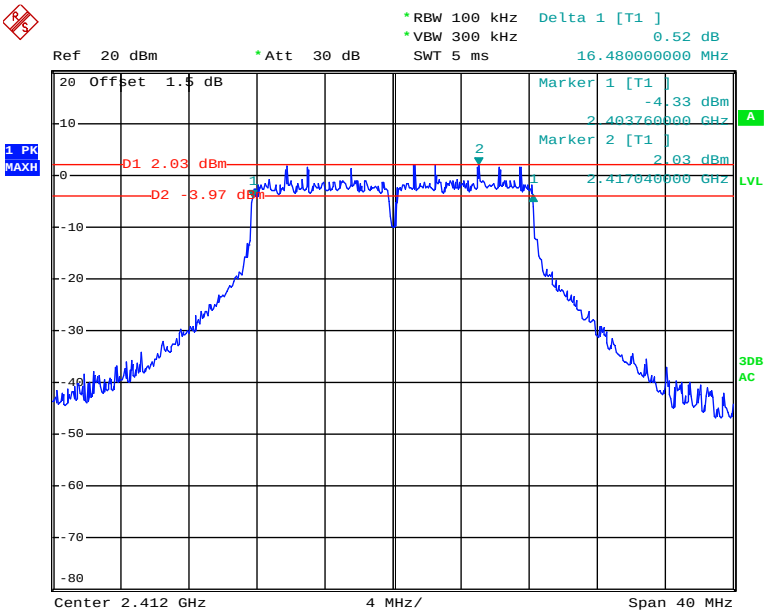
802.11g Low Channel



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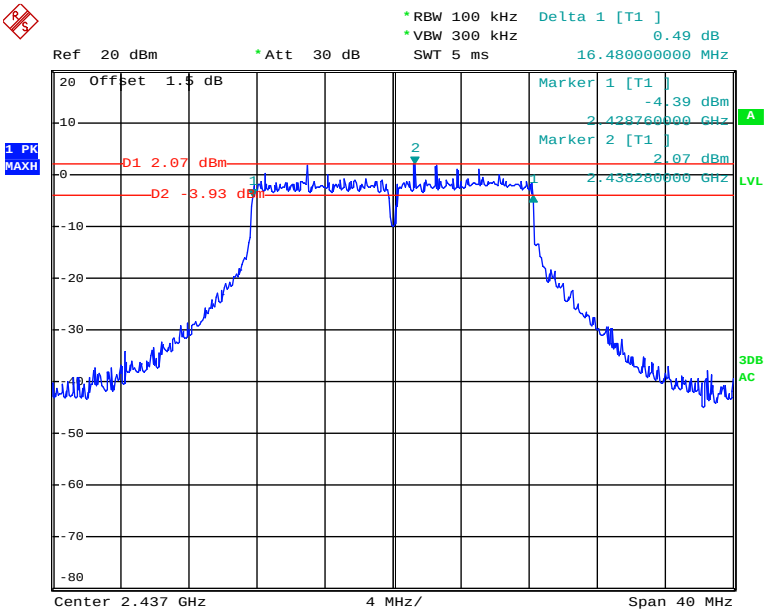
802.11g Middle Channel



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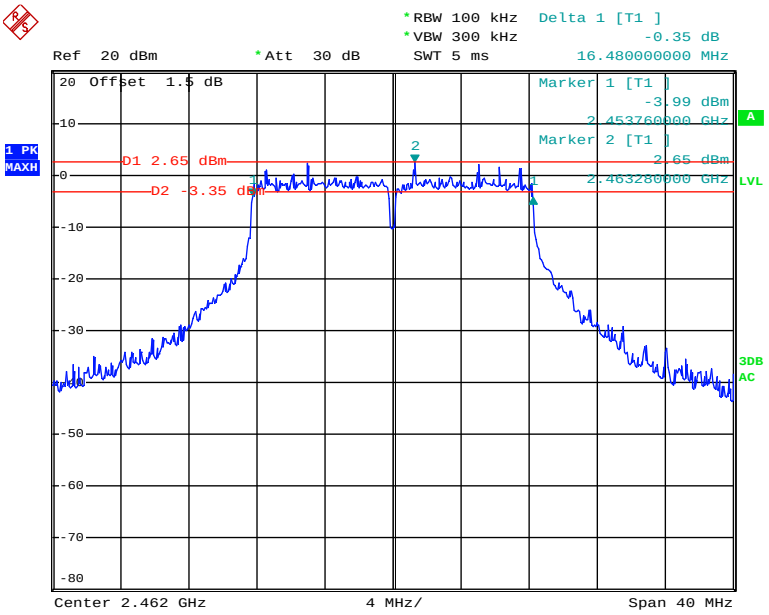
802.11g High Channel



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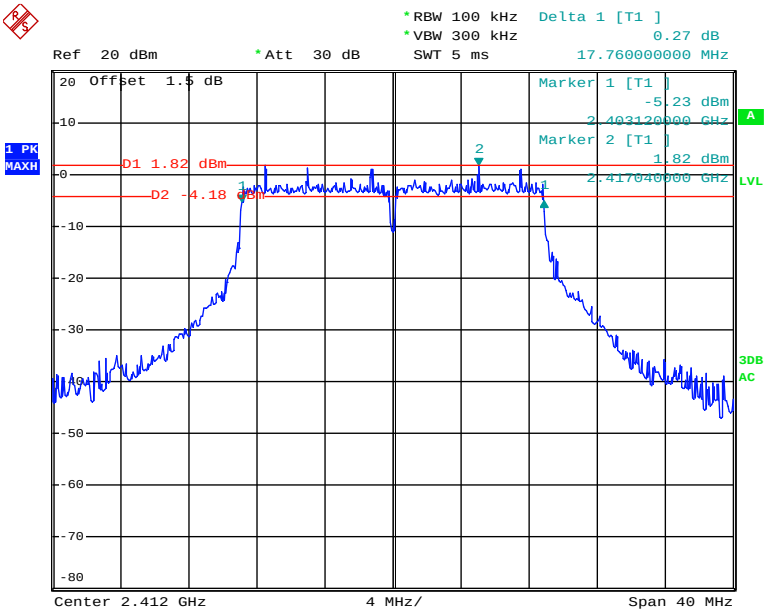
802.11n ht20 Low Channel



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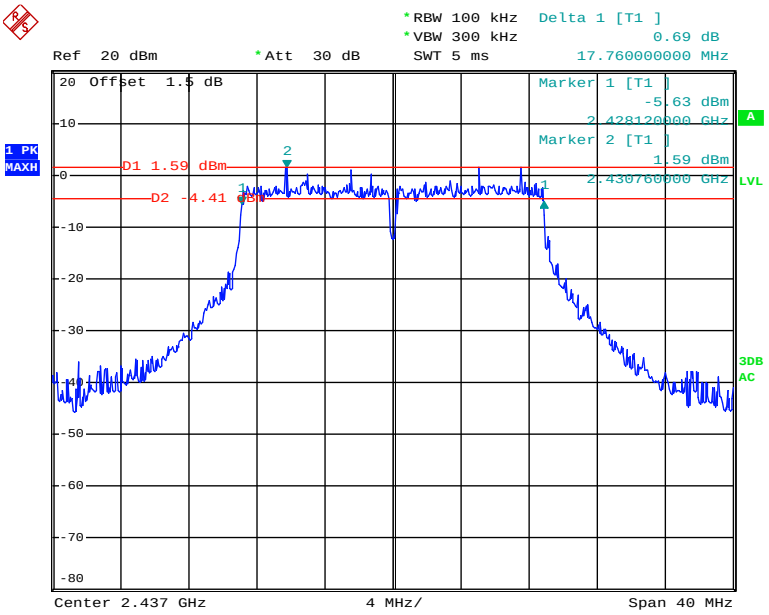
802.11n ht20 Middle Channel



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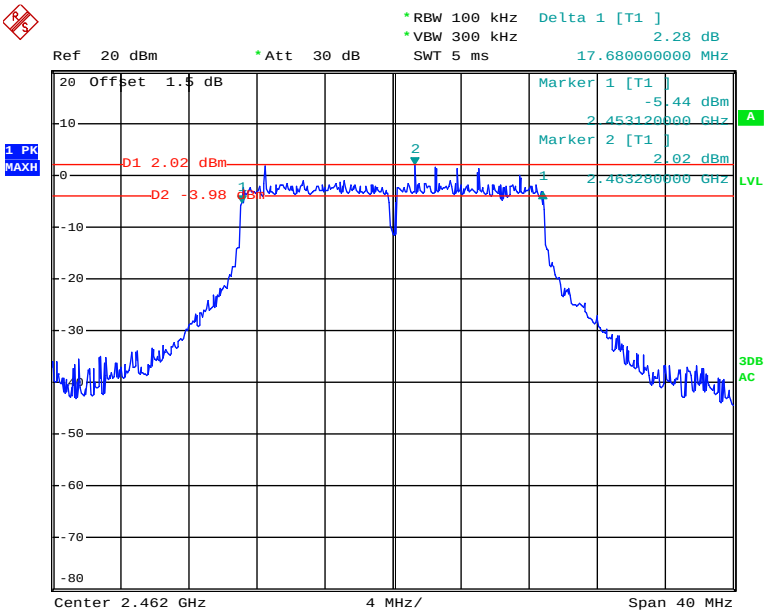
802.11n ht20 High Channel



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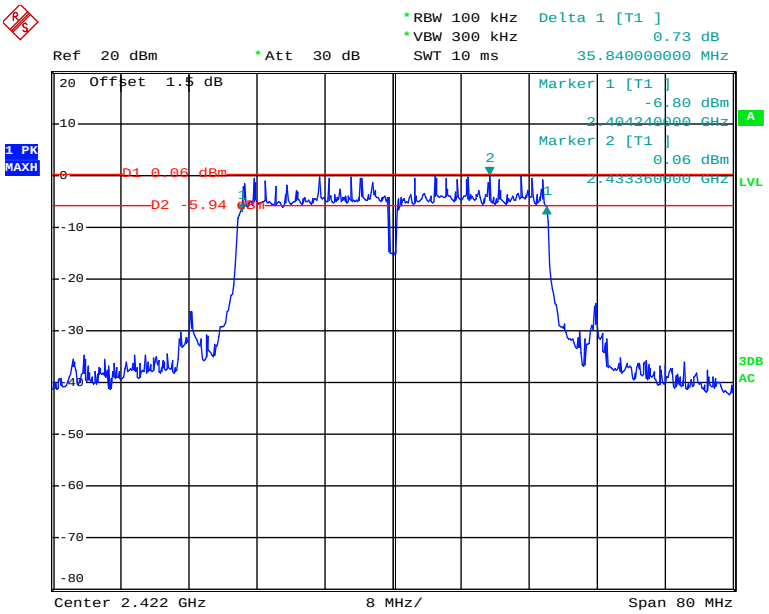
802.11n ht40 Low Channel



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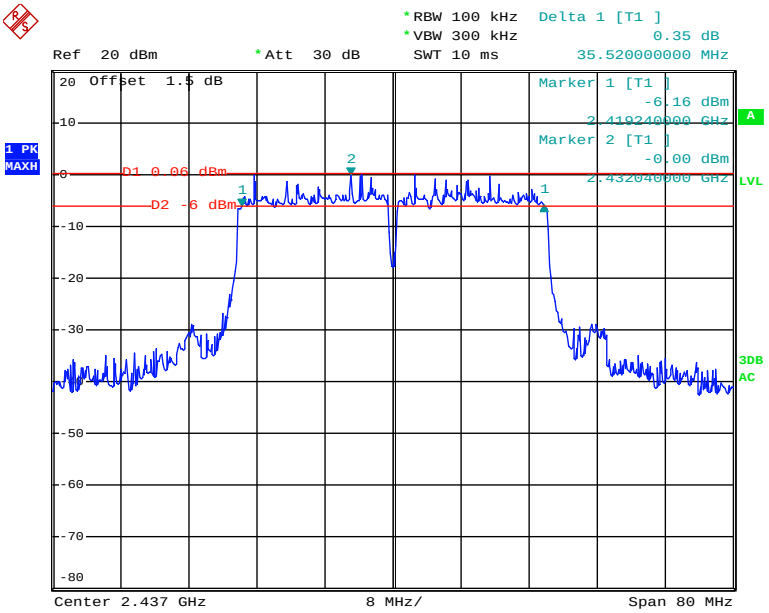
802.11n ht40 Middle Channel



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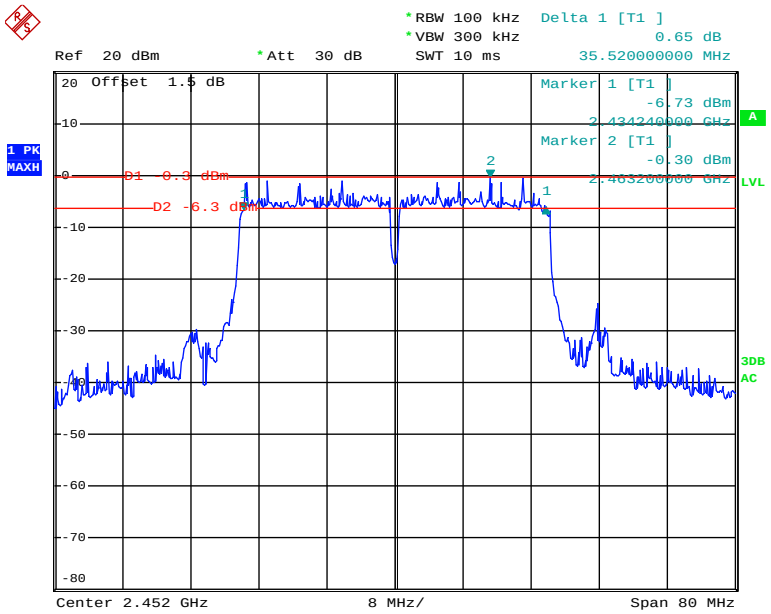
802.11n ht40 High Channel



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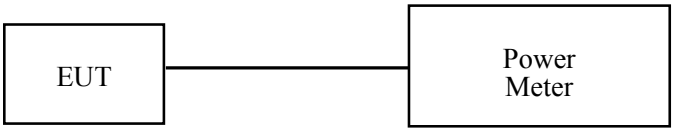
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to test equipment.
3. Add a correction factor to the display.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Wideband Power Sensor	N1921A	MY54210016	2015-11-03	2016-11-03
Agilent	Wideband Power Sensor	N1921A	MY54170013	2015-11-03	2016-11-03
Agilent	P-Series Power Meter	N1912A	MY5000448	2015-11-03	2016-11-03
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	31.2 °C
Relative Humidity:	53 %
ATM Pressure:	100.2 kPa

** The testing was performed by Lion Xiao on 2016-06-10.*

Test Mode: Transmitting

Test Result: Compliant. Please refer to the following table.

Test mode	Channel	Frequency	Max Peak Conducted Output Power	Limit
		(MHz)	(dBm)	(dBm)
802.11b	Low	2412	20.86	30
	Middle	2437	20.79	30
	High	2462	20.90	30
802.11g	Low	2412	19.53	30
	Middle	2437	19.86	30
	High	2462	19.80	30
802.11n20	Low	2412	20.07	30
	Middle	2437	19.95	30
	High	2462	20.01	30
802.11n40	Low	2422	20.45	30
	Middle	2437	20.21	30
	High	2452	20.64	30

FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2015-11-23	2016-11-22
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

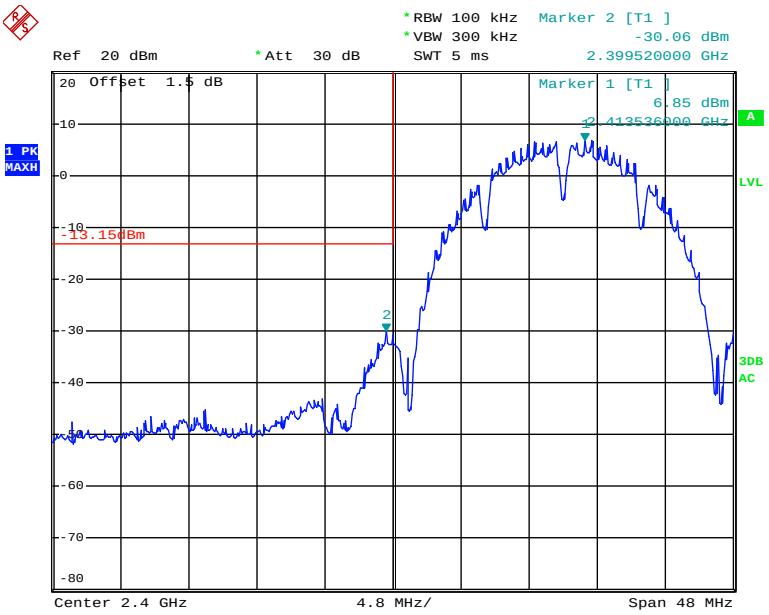
Temperature:	31.2 °C
Relative Humidity:	53 %
ATM Pressure:	100.2 kPa

** The testing was performed by Lion Xiao on 2016-06-10.*

Test mode: Transmitting

Test Result: Compliant. Please refer to following plots.

802.11b: Band Edge, Left Side



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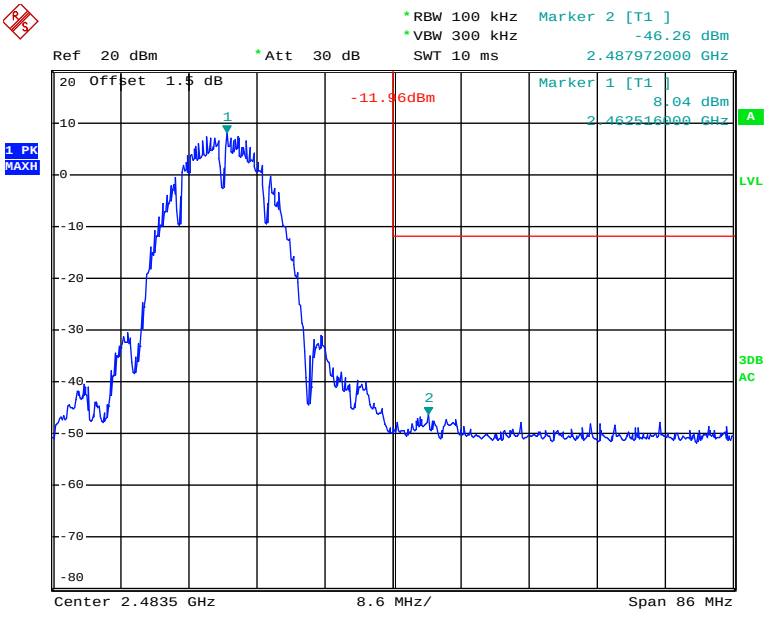
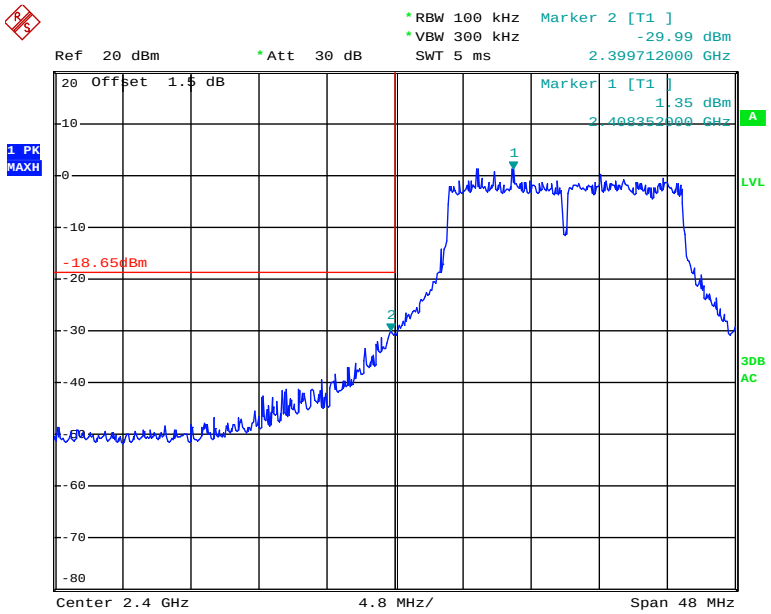
802.11b: Band Edge, Right Side



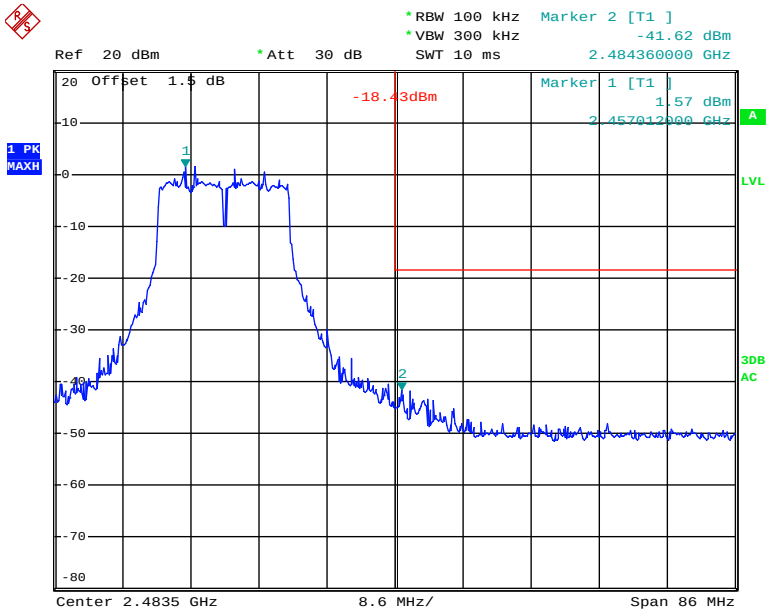
Date: 10.JUN.2016 22:36:04

802.11g: Band Edge, Left Side



Date: 10.JUN.2016 22:46:16

802.11g: Band Edge, Right Side



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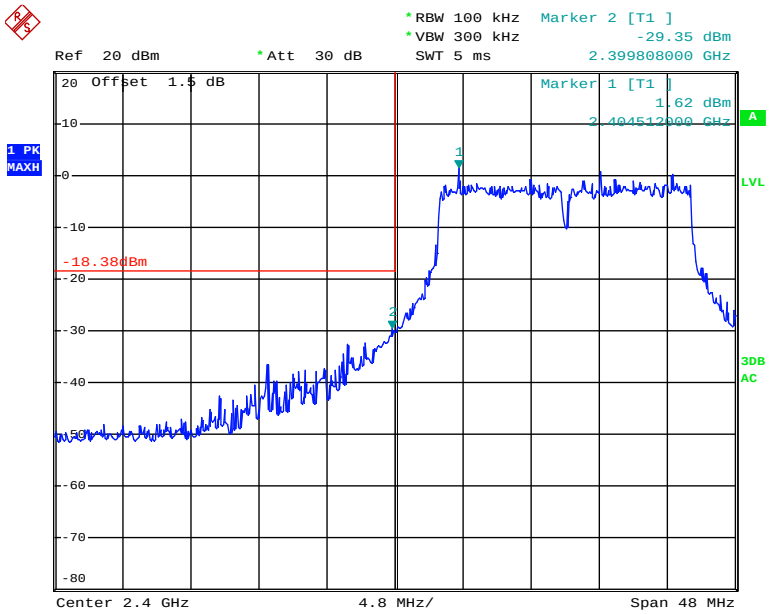
802.11n ht20 Band Edge, Left Side



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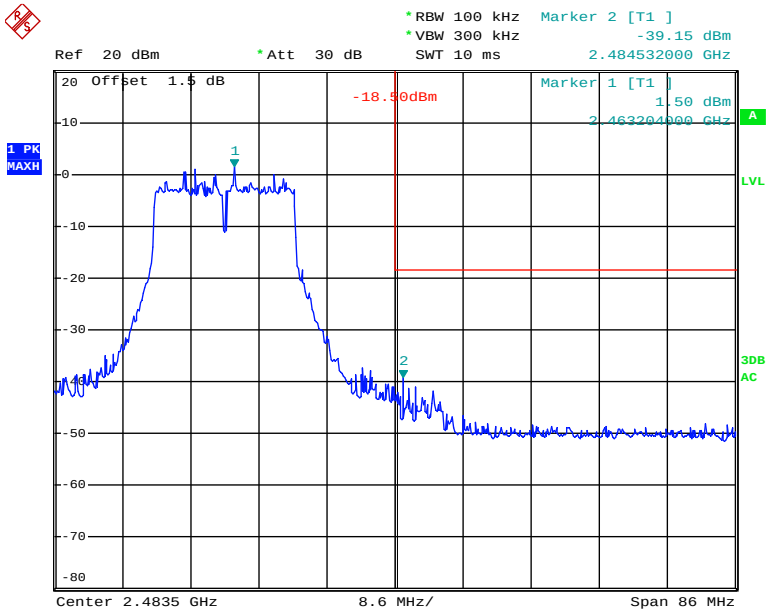
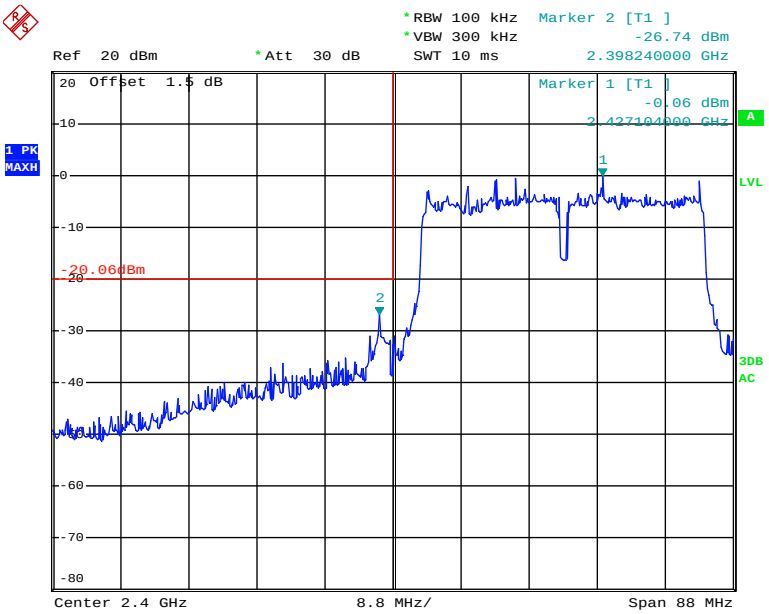
802.11n ht20 Band Edge, Right Side



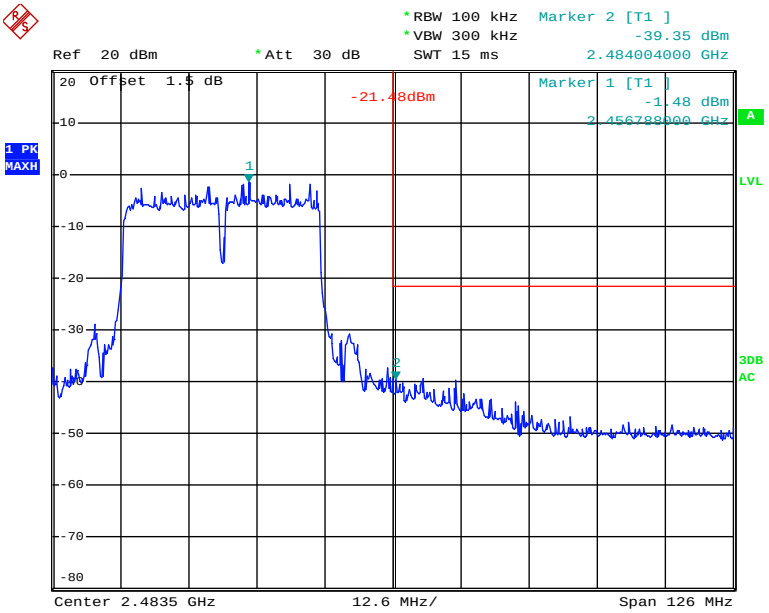
Date: 10.JUN.2016 23:26:44

802.11n ht40 Band Edge, Left Side



Date: 10.JUN.2016 21:35:56

802.11n ht40 Band Edge, Right Side



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FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Procedure

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ 3×RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2015-11-23	2016-11-22
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	31.2 °C
Relative Humidity:	53 %
ATM Pressure:	100.2 kPa

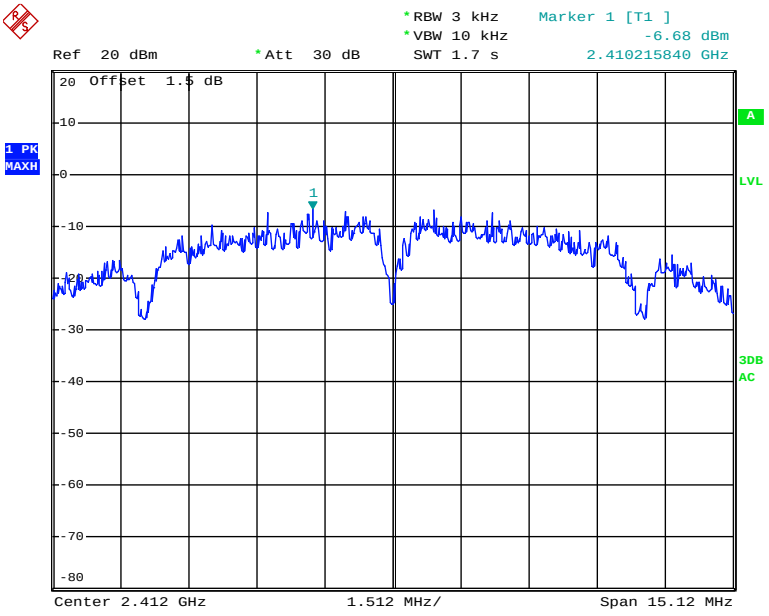
** The testing was performed by Lion Xiao on 2016-06-10.*

Test Mode: Transmitting

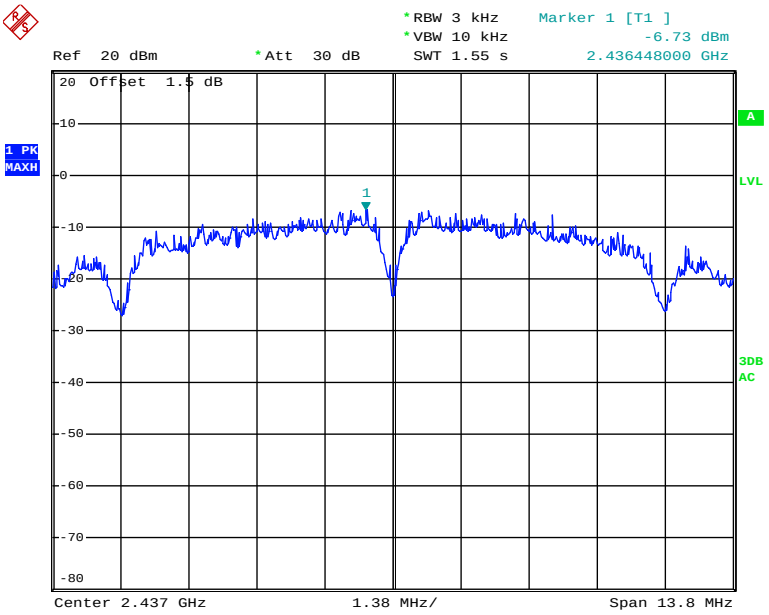
Test Result: Compliant. Please refer to the following table and plots

Test mode	Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b	Low	2412	-6.68	≤8
	Middle	2437	-6.73	≤8
	High	2462	-6.65	≤8
802.11g	Low	2412	-13.89	≤8
	Middle	2437	-13.66	≤8
	High	2462	-13.68	≤8
802.11n20	Low	2412	-14.00	≤8
	Middle	2437	-14.09	≤8
	High	2462	-14.03	≤8
802.11n40	Low	2422	-16.64	≤8
	Middle	2437	-16.83	≤8
	High	2452	-16.43	≤8

Power Spectral Density, 802.11b Low Channel



Power Spectral Density, 802.11b Middle Channel



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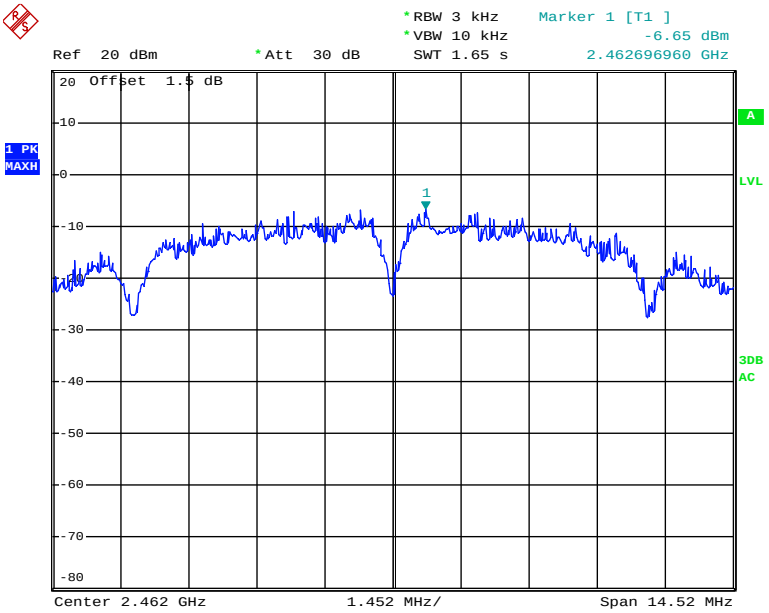
Power Spectral Density, 802.11b High Channel



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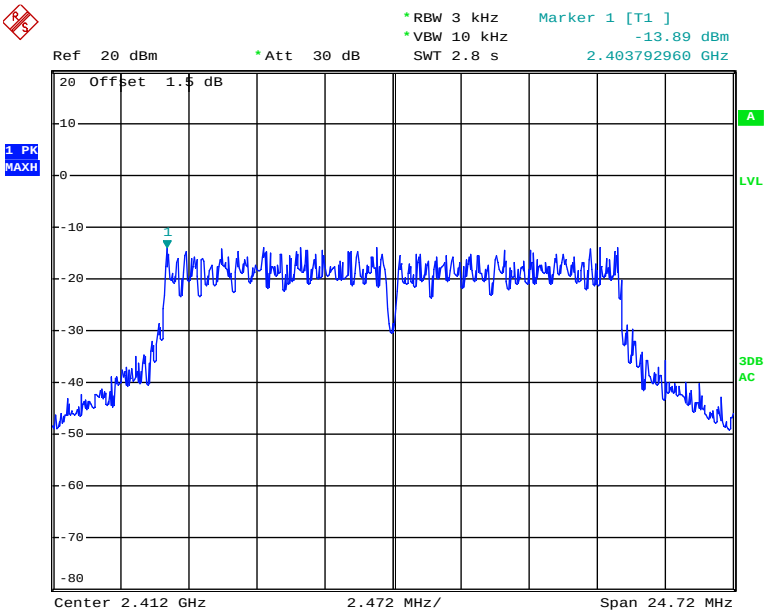
Power Spectral Density, 802.11g Low Channel



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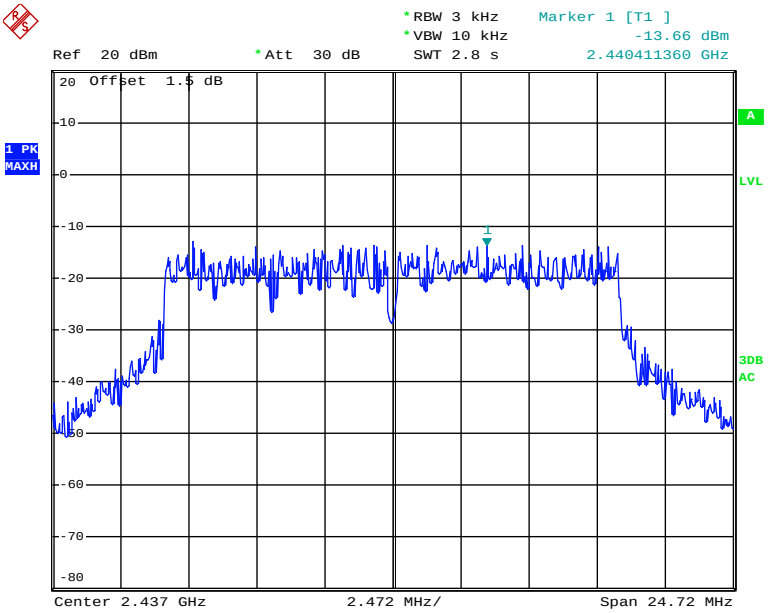
Power Spectral Density, 802.11g Middle Channel



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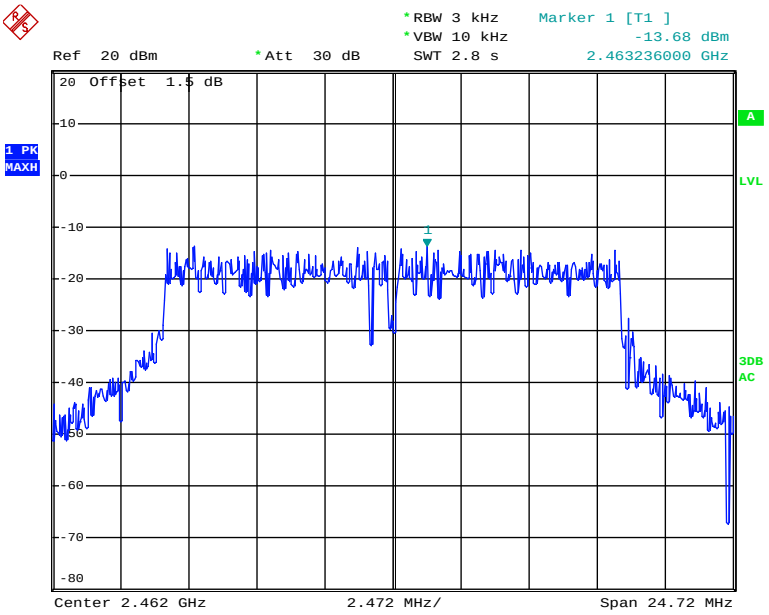
Power Spectral Density, 802.11g High Channel



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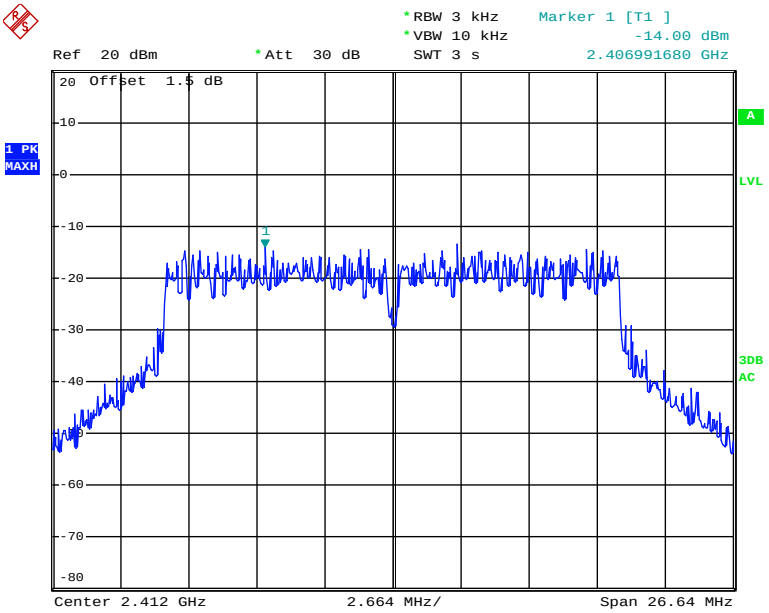
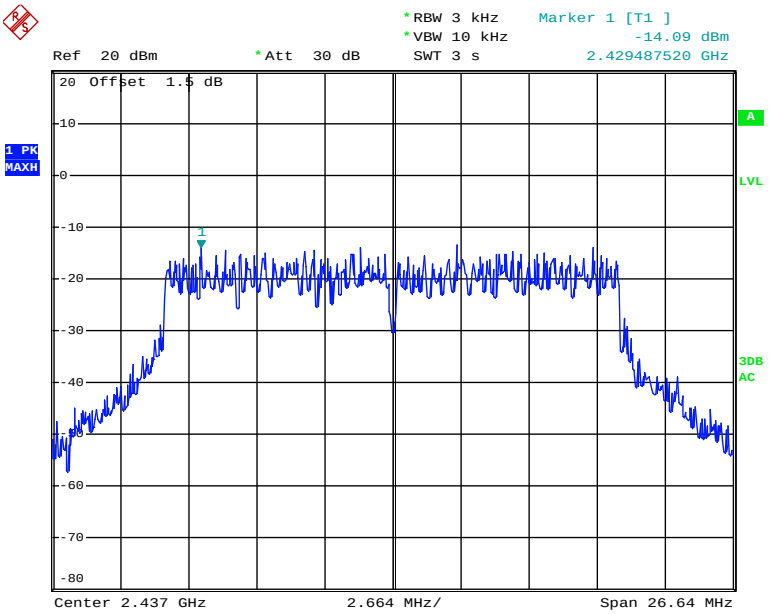
Power Spectral Density, 802.11n ht20 Low Channel



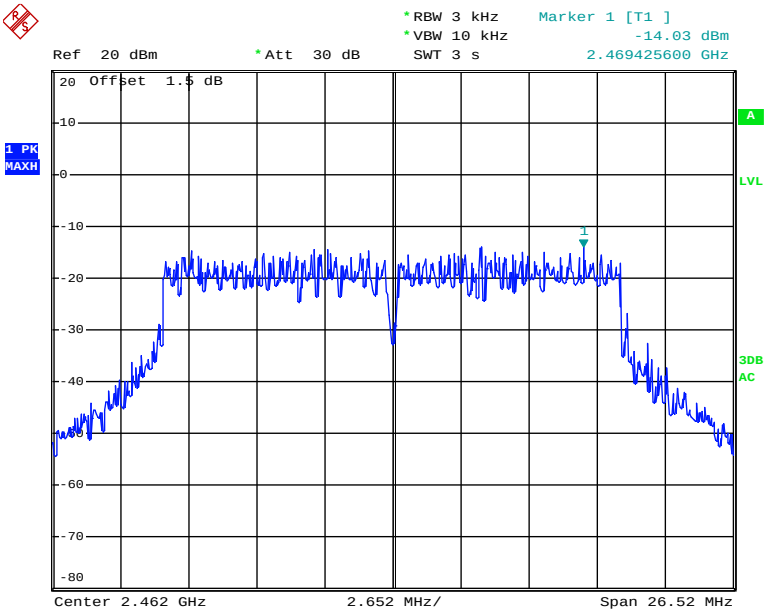
Date: 10.JUN.2016 23:03:49

Power Spectral Density, 802.11n ht20 Middle Channel



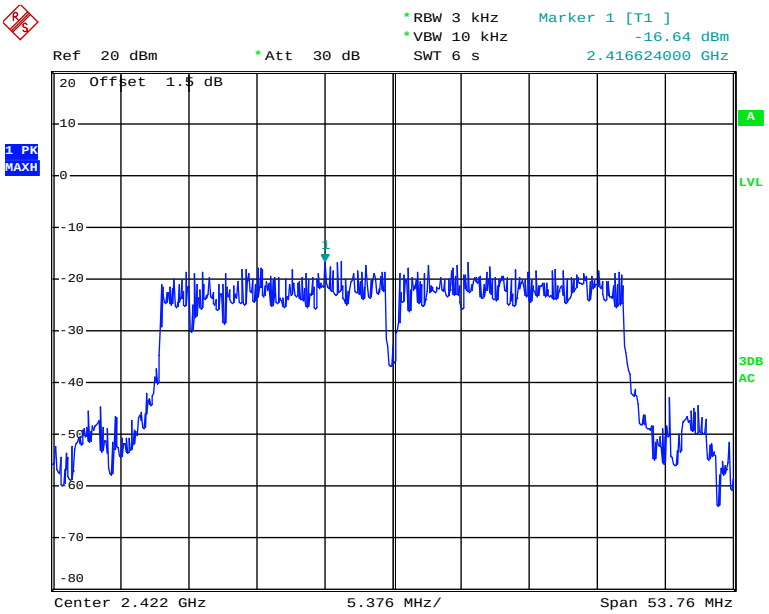
Date: 10.JUN.2016 23:15:29

Power Spectral Density, 802.11n ht20 High Channel



Date: 10.JUN.2016 23:26:11

Power Spectral Density, 802.11n ht40 Low Channel



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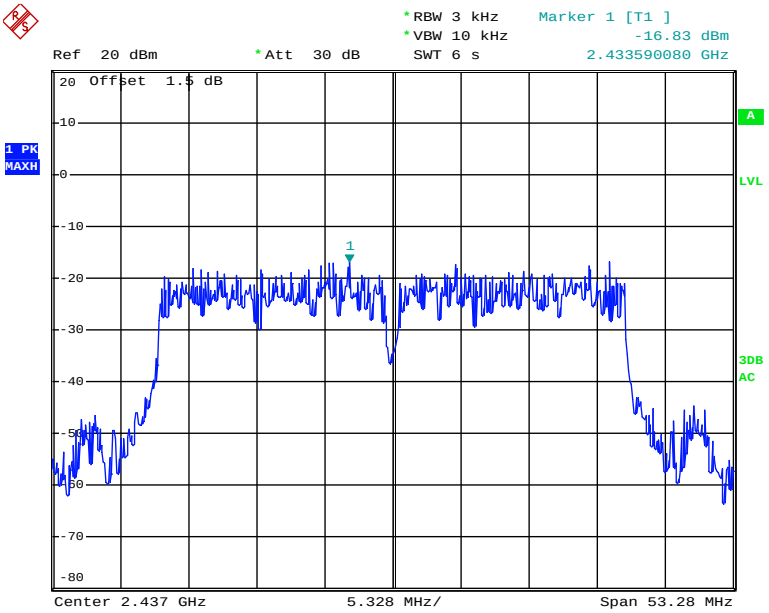
Power Spectral Density, 802.11n ht40 Middle Channel



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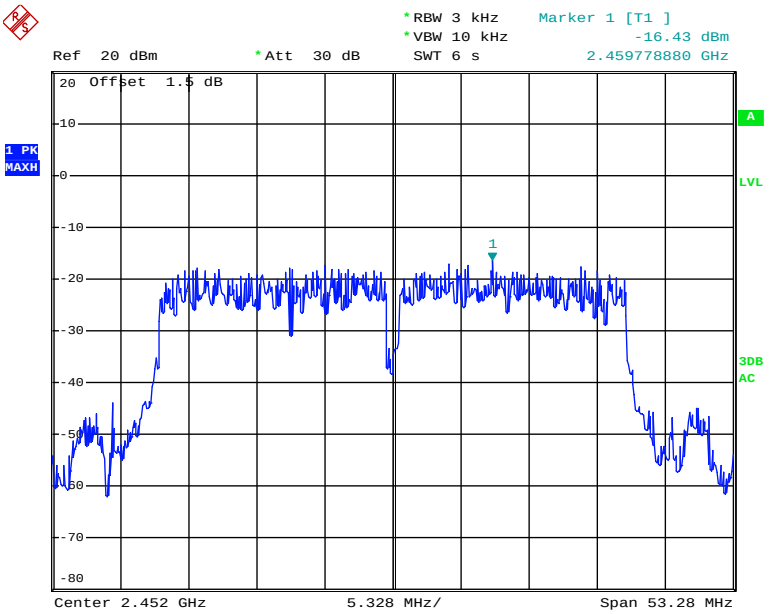
Power Spectral Density, 802.11n ht40 High Channel



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